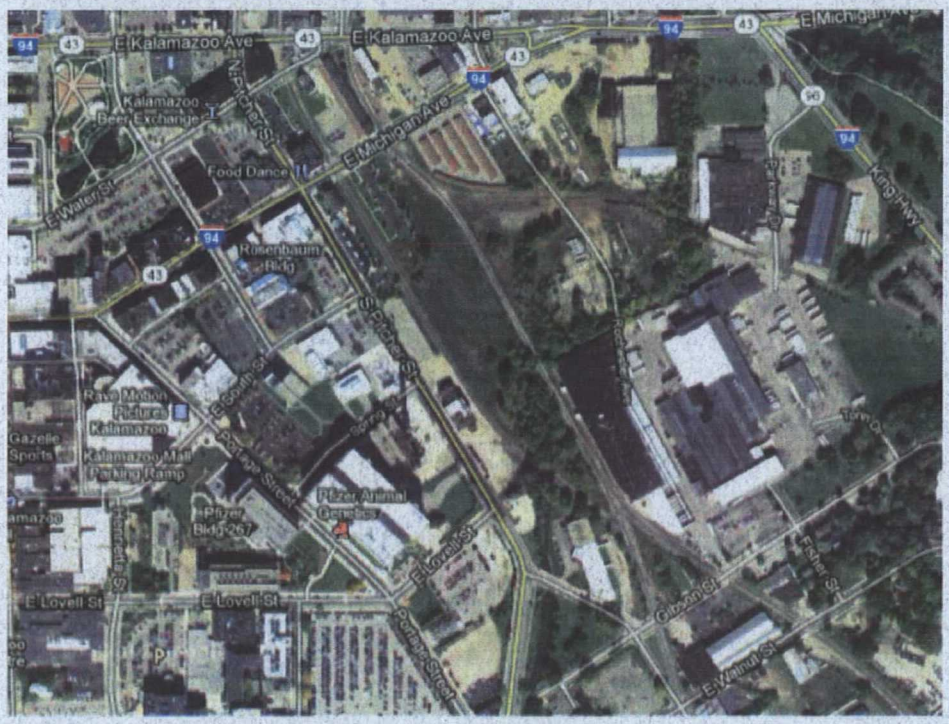
Portage Creek Sediment Remediation Project
Kalamazoo, Michigan

Pre-Sediment Removal Structure Feature Assessment
Removal Areas SA3-A, SA3-B and SA3-Access



Prepared For:

Environmental Quality Management, Inc.

Prepared By:

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F&V Project Number: 809930
August, 2012

General Notes:

- The following list of structures was generated based on a field review of the removal area supplemented with a review of available construction records. It may not be an exhaustive list of constructed features in the removal area. If additional constructed features are encountered during sediment removal operations, F&V should be notified of the discovery to allow for review of their potential impact on the project.

- Pre-Sediment Removal review was focused on the channel and bank areas, including structures potentially impacted directly by the removal of sediment. There are other structures in the general project area which should be avoided or protected from damage from construction equipment during removal and transportation of sediment.

- As is the case when undertaking any underground work, Miss Dig should be contacted to locate active utilities in the project area prior to commencing removal operations.

Designation: SA3-A-S01

Location: SA3-A-S01 is a series of 3 railroad bridges at the south end of area SA3.

Description: SA3-A-S01 is a series of 3 railroad bridges two carrying tracks and the 3rd a supplemental structure. The bridges have timber pile bents and timber pile and lagging abutments. The structures carrying tracks have riveted steel girders (timber beams on the supplemental structure), which support the timber railroad ties, steel track and steel grating.

Pre-existing Condition:

- There is a large amount of heavy woody debris on the upstream end of the structures.
- Moderate rot and section loss was noted on a number of ends of timber members.
- There is heavy brush growth encroaching on the structures.
- The timber lagging in the southeast has minor undermining.
- Scattered splitting and checking and creosote bleeding was noted in timber members.
- There is a 42" concrete outlet in the southwest bank. The bank in the area is supported by sheet piling, which has critical corrosion with holes in sheets and a number of failed sheets.
- There are conduits on the south side of the structure and one failed conduit on the north side hanging into the channel.
- Riveted steel girders have moderate corrosion and section loss.
- Railroad tie deck on tracked structures is newer timber.

Protective Measures:

- We understand that a cofferdam is to be installed just north of the structure to facilitate sediment removal. The structures are supported on deep foundations (timber piles), which are less susceptible to vibration and settlement due to adjacent construction than shallow foundations. However, sheet piling should be located with a minimum of 6' clearance to the structure to avoid impacting battered piling, which extends away from the footprint of the structure at grade. A sand bag cofferdam could be located closer to the structure, as it would not have the same impact on structures below grade.

Structure viewed from track level

Elevation view of the structure

Concrete outlet in the southwest with failed sheet pile headwall

Failed sheet pile in the southwest

Failed sheet pile in the southwest

Checking and splitting on ends of timber beams

Vegetation growth on timber bent

Debris on upstream end of structure

Conduit supported on south side of north structure

Corrosion and section loss on steel girder

Corrosion and section loss on steel girder and checking on timber beam

Brooming of timber pile

Failed conduit on north side of north structure

Brush growth encroaching on structure

Cable inside conduit exposed at grade from conduit failure

Corrosion on steel railings

Vegetation growth in timber curb

Tree and brush growth encroaching on structure

Designation: SA3-A-S02

Location: SA3-A-S02 is located in the east Portage Creek floodplain area, approximately 25' north of the railroad structure at the south end of SA3-A.

Description: SA3-A-S02 is a timber pole with steel guy wire and anchorage.

Pre-existing Condition:

- The timber pole has minor splitting. It leans toward the channel slightly.
- The steel guy wire and support have moderate corrosion.

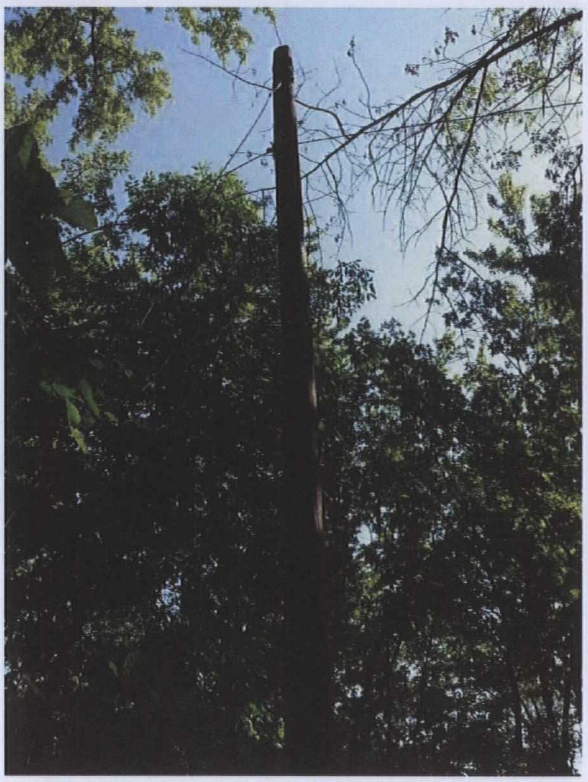
Protective Measures:

- We understand that sediment removal in SA3-A will extend into this floodplain area along the east bank. Sediment should not be removed within the 1:1 influence area of the pole or guy anchor unless the pole is supported during the work.
- Construction fencing or similar means should be used to identify the pole and guy to operators and drivers during the work.

View of the structure from the channel

Corrosion on the guy wire and anchorage

View of the pole from the north showing slight lean toward the channel



View of the overhead facilities carried by the pole

Designation: SA3-A-S03

Location: SA3-A-S03 is located on the west bank of Portage Creek, approximately 50' north of the railroad structure at the south end of SA3-A.

Description: SA3-A-S03 is a series of concrete slabs placed as riprap.

Pre-existing Condition:

- The concrete slabs have moderate undermining along the waterline.
- A number of slabs have settled into the channel.

Protective Measures:

- The slabs should be removed and replaced as required to facilitate sediment removal.

View of the structure from the channel

Undermined slabs along the waterline

View of the structure from the north channel

Settlement of slabs into the channel

Designation: SA3-A-S04

Location: SA3-A-S04 is located 50' south of the railroad structure at the north end of SA3-A.

Description: SA3-A-S04 is an abandoned railroad bridge. The structure is composed of timber pile bents, timber pile and lagging abutments and timber beams.

Pre-existing Condition:

- The surface of the structure is covered with heavy vegetation.
- There is a large amount of squatter debris under the east span of the structure.
- Timber piles have various stages of section loss. The second pile from the south on the east pier has failed from progressed loss, as well as several others.
- Timber beams and pile caps have scattered splitting.
- Railings for the structure have failed.
- Moderate to severe bank erosion was noted around the structure.

Protective Measures:

- Sheet pile cofferdams should be located a minimum of 6 feet from the footprint of the structure to protect battered piling, which extends beyond the footprint. Sand bag cofferdams could be placed closer to the structure.

View of the structure from the south channel

Heavy surface debris and vegetation

Severe section loss on timber piles of east pier

Severe section loss on timber pile

Woody channel debris on upstream end of structure

Failed timber pile at abutment

Designation: SA3-A-S05

Location: SA3-A-S05 is located at the north end of SA3-A.

Description: SA3-A-S05 is a railroad bridge over Portage Creek. The structure has steel track supported on timber ties, which are carried by riveted steel girders. The structure has timber railings and concrete abutments.

Pre-existing Condition:

- Concrete abutments appear to be in fair to good condition.
- Moderate to severe bank erosion was noted around the structure.
- Steel girders have minor to moderate corrosion and scale. The steel bearings have moderate surface corrosion.
- The channel is lined with ballast under the structure, which has created a shallow rapid section.
- There is a large tree caught in the channel under the structure.
- The timber ties have moderate creosote bleeding.

Protective Measures:

- Sheet pile cofferdams should be located a minimum of 6 feet from the footprint of the structure to protect battered piling, which extends beyond the footprint. Sand bag cofferdams could be placed closer to the structure.

View of structure from approach track

Elevation view of structure

Large tree in channel at structure

Severe bank erosion at abutment

View of bearing area with debris on bridge seat

Severe bank erosion along abutment

Designation: SA3-B-S01

Location: SA3-B-S01 is located at the south end of SA3-B.

Description: SA3-B-S01 is the Pitcher Street Bridge over Portage Creek. The structure is composed of side by side concrete box beams on cast in place concrete abutments. The structure has an asphalt wearing surface and concrete sidewalk/brush block and parapet railings.

Pre-existing Condition:

- The asphalt wearing surface is severely cracked and spalled with cold patch. Asphalt approach pavement have scattered cracking.
- The concrete sidewalk (on the north side) has moderate cracking. Approach sidewalks have moderate settlement at the structure. There is severe cracking and spalling in the northeast with exposed steel.
- The southeast concrete curb has severe cracking.
- The southeast guardrail has moderate collision damage and is bowed outward.
- There is a water main suspended along the south fascia.
- Gabion baskets in the southeast and southwest are overgrown but in fair condition.
- Overhead utilities were noted north and south of the structure.
- Efflorescence and stalactites were noted along box beam joints.
- There is a concrete outlet through the west abutment.
- Scattered minor vertical cracking was noted in the abutments.
- The northeast and northwest banks have stepped gabion baskets in fair condition with scattered vegetation and stone loss along the waterline.
- According to the construction plans, the structure is founded on spread footings. The bottom of footing is approximately 17.5' below bottom of beam.

Protective Measures:

- We understand that sediment removal is not planned for area SA3-B. If plans change, caution should be used when working around the Pitcher Street Bridge, as it is supported on a shallow foundation system. Sediment excavation should not extend any lower than the bottom of footing elevation, as removal of overburden pressure can reduce the bearing capacity of adjacent soils.
- If a cofferdam is required for dewatering, sheet pile should be installed with a minimum 10' clearance to the bridge. Connections to the gabion baskets at the ends of the cofferdam should be sand bags to avoid damaging the baskets.

Structure: SA3-B-S01 Date: July 17, 2012

View of structure from the approach area

Elevation view of structure

Cracking and cold patch along west reference line

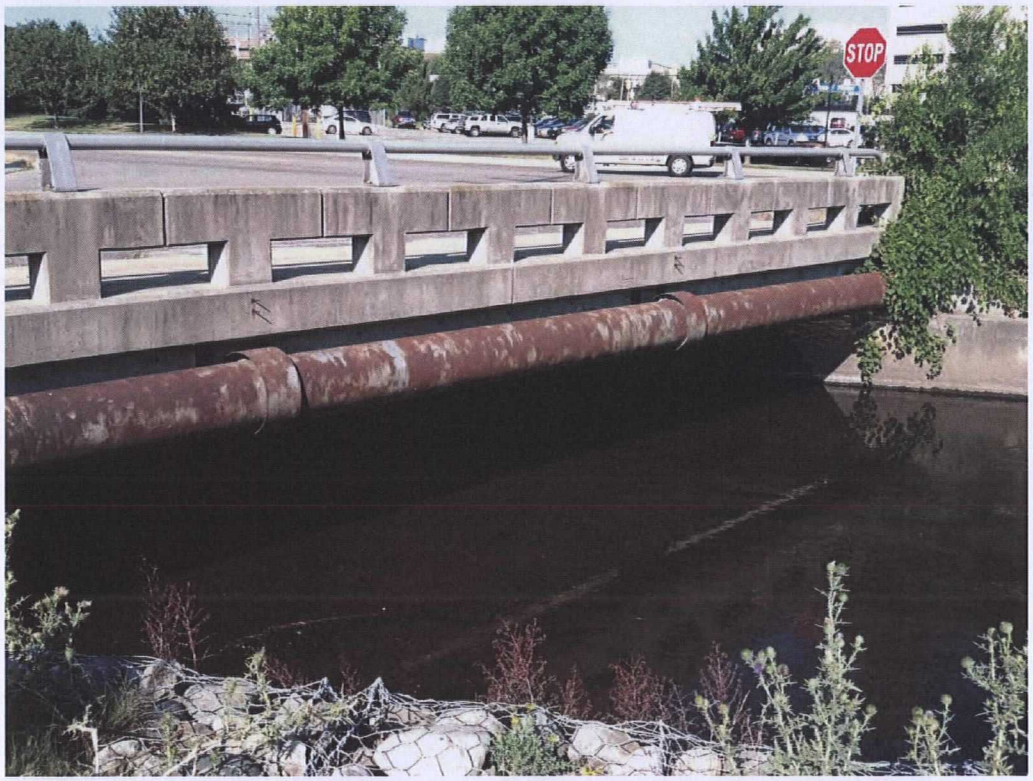
Spalling and cold patch in asphalt wearing surface

Cracking and spalling of approach sidewalk

Corner spalling on curb and sidewalk in northeast

Critical cracking of southeast approach curb

Bowed guardrail in southeast



Corrosion on utility supported along north fascia

Efflorescence and stalactites along box beam joints

Gabion baskets in northwest with brush growth and displaced stones at waterline

Gabion baskets in northeast with brush growth and displaced stones at waterline

Gabion baskets in northeast with brush growth and displaced stones at waterline

Gabion baskets in northeast with brush growth and displaced stones at waterline

Designation: SA3-B-S02

Location: SA3-B-S02 is located on the west bank of Portage Creek approximately 25' north of the Pitcher Street Bridge.

Description: SA3-B-S02 is a 30-inch diameter concrete storm sewer outlet extending through the gabion baskets in the northwest quadrant of the bridge.

Pre-existing Condition:

- Approximately 3' of the pipe is exposed beyond the face of the gabion baskets.
- There is a plunge pool approximately 2' deep around the outlet.
- The concrete pipe is in fair to good condition.

Protective Measures:

- If a cofferdam is required for dewatering, it should be installed with a minimum 2' clearance to the outlet to avoid adversely impacting it. It will be difficult to install a sheet pile cofferdam against the gabion baskets without damaging them. Therefore sand bags are recommended either against the baskets or for the entire cofferdam.

Structure: SA3-B-S02 Date: July 17, 2012

Outlet viewed from the channel

Stone loss in baskets along the waterline

Designation: SA3-B-S03

Location: SA3-B-S03 is located on the east bank of Portage Creek approximately 50' north of the Pitcher Street Bridge.

Description: SA3-B-S03 is a concrete headwall with 2" steel, 8" clay and 15" clay outlets.

Pre-existing Condition:

- The bank is severely eroded around the structure, exposing the clay pipes behind the headwall.
- The concrete headwall has moderate to severe cracking.

Protective Measures:

- If a cofferdam is required for dewatering, it should be installed with a minimum 4' clearance to the headwall to avoid adversely impacting it. We recommend contacting the property owner for permission to remove the headwall and cut off the outlets at the bank.

Structure: SA3-B-S03 Date: July 17, 2012

View of structure from south channel showing cracking and spalling of headwall

Severe bank erosion behind headwall

Designation: SA3-B-S04

Location: SA3-B-S04 is located at the top of the west bank of Portage Creek approximately 100' north of the Pitcher Street Bridge.

Description: SA3-B-S04 is a concrete parking lot. The bank along the parking lot is supported by a concrete retaining wall.

Pre-existing Condition:

- The concrete retaining wall is in poor condition, leaning in several locations. There are several severe to critical vertical cracks in the wall. Growth of a large tree behind the wall has caused ~2" offset at one of the cracks.
- The parking lot is newer concrete paving.

Protective Measures:

- The wall and lot are far enough removed from the channel to avoid impact, however they should be protected from equipment damage during the work.

View of parking lot from the south

View of the retaining wall from the south

Critical vertical crack and leaning section of retaining wall at tree growth

Severe vertical crack and spall in retaining wall

Structure: SA3-B-S04 Date: July 17, 2012

View of parking lot along top of bank

View of parking lot along top of bank

Structure: SA3-B-S04 Date: July 17, 2012

Critical cracking and leaning of wall at tree growth

Designation: SA3-B-S05

Location: SA3-B-S05 is located on the east bank of Portage Creek approximately 100' north of the Pitcher Street Bridge.

Description: SA3-B-S05 is a sampling station at the top of bank with PVC sampling tube supported on steel posts extending into the channel.

Pre-existing Condition:

- There is moderate corrosion on the steel post in the channel.
- The PVC sampling tube is not connected to the unit at the top of the bank.

Protective Measures:

- Coordinate with the City to remove and replace the structure if required for sediment removal.
- Identify the structure to operators and drivers with construction fencing or similar during the work.

Structure: SA3-B-S05 Date: July 17, 2012

View of PVC sampling tube from south channel

View of structure from channel

Designation: SA3-B-S06

Location: SA3-B-S06 is located at the north end of area SA3-B.

Description: SA3-B-S06 is a series of 3 railroad bridges two carrying tracks and the 3rd a supplemental structure. The bridges have timber pile bents and timber pile and lagging abutments. The structures carrying tracks have riveted steel girders (timber beams on the supplemental structure), which support the timber railroad ties, steel track and steel grating.

Pre-existing Condition:

- Refer to the feature assessment for area SA3-A (Structure SA3-A-S01), as the railroad structures represent the dividing line between the two areas.

Protective Measures:

- If a cofferdam is required for dewatering operations, it should be located south of the 42" outlet with a minimum clearance of 4'.
- Because the structures are supported on deep foundations (timber piles), they are less susceptible to vibration and settlement as structures on shallow foundations.

Structure: SA3-B-S06 Date: July 17, 2012

Structure viewed from track level

Elevation view of structure

Designation: SA3-Access-S01

Location: SA3-Access-S01 is located between the north end of area SA3-A and East Michigan Avenue.

Description: SA3-Access-S01 is an open field bounded by area SA3-A to the south, railroad tracks to the east, railroad tracks and a parking lot to the west and East Michigan Avenue to the north.

Pre-existing Condition:

- The field is weed-covered with several paths worn between East Michigan Avenue and area SA3-A. The area along the parking lot in the northwest and along East Michigan Avenue are mowed.

Protective Measures:

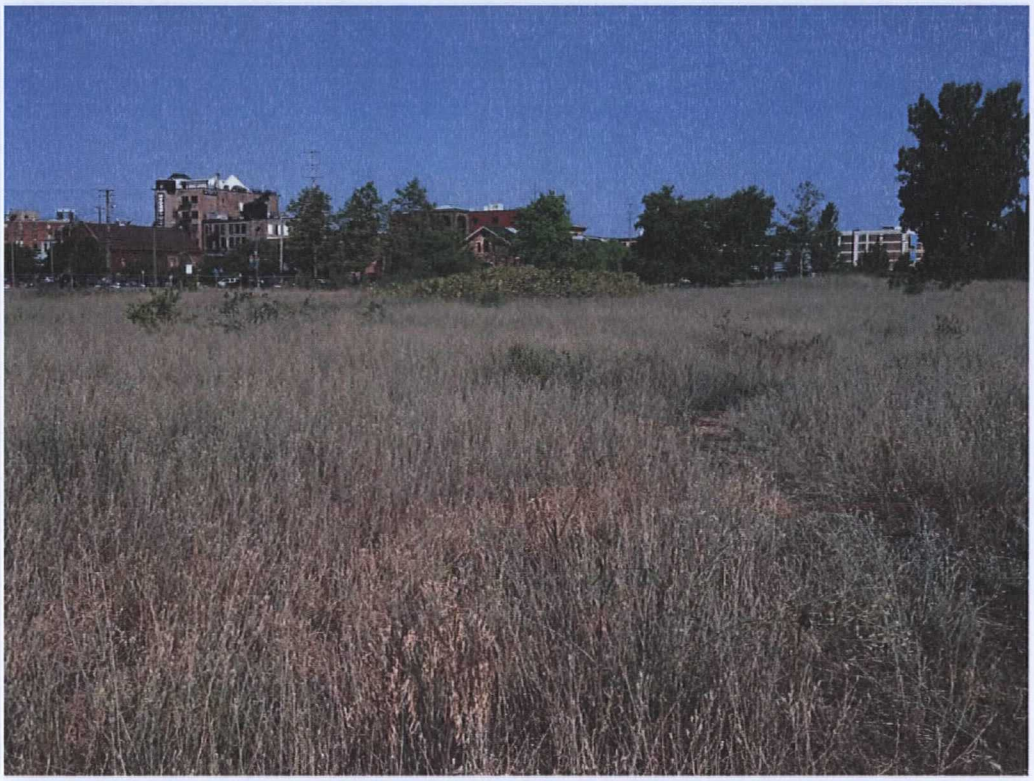
- The field should be restored as directed by the property owner.

Structure: SA3-Access-S01 Date: July 17, 2012

View of area from SA3-A

View of area looking north

Structure: SA3-Access-S01 Date: July 17, 2012



View of area looking northeast

View of area looking northeast

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking northwest

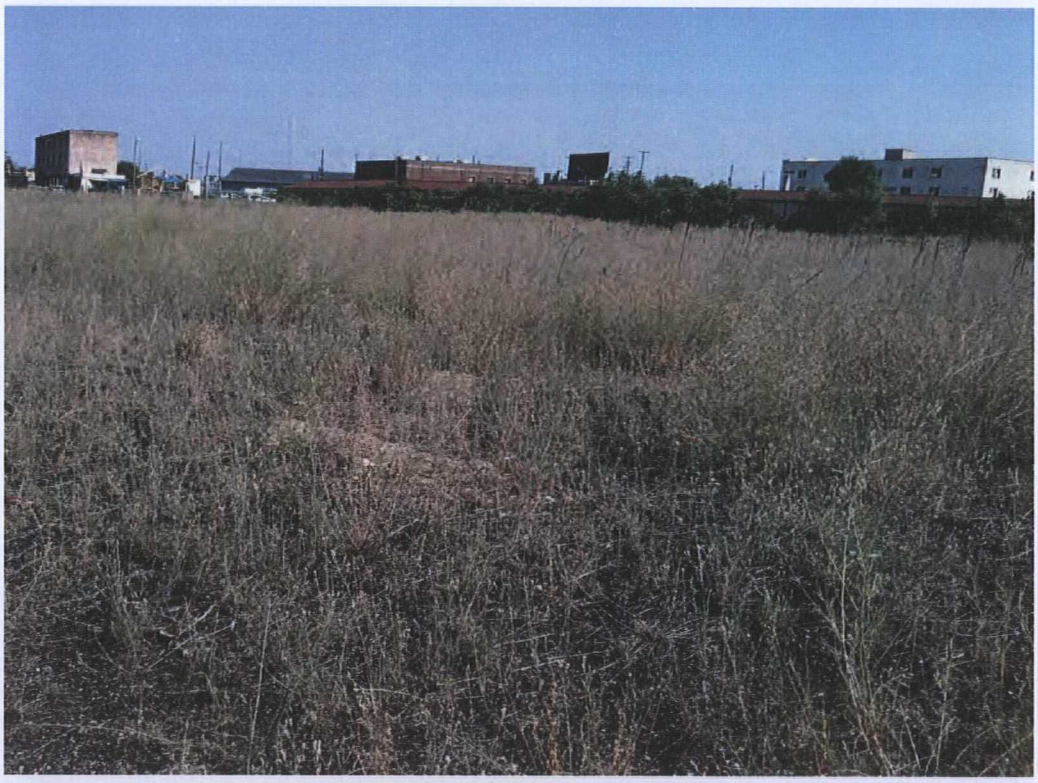
View of area looking northeast

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking northwest

View of area looking north

Structure: SA3-Access-S01 Date: July 17, 2012



View of area looking northeast

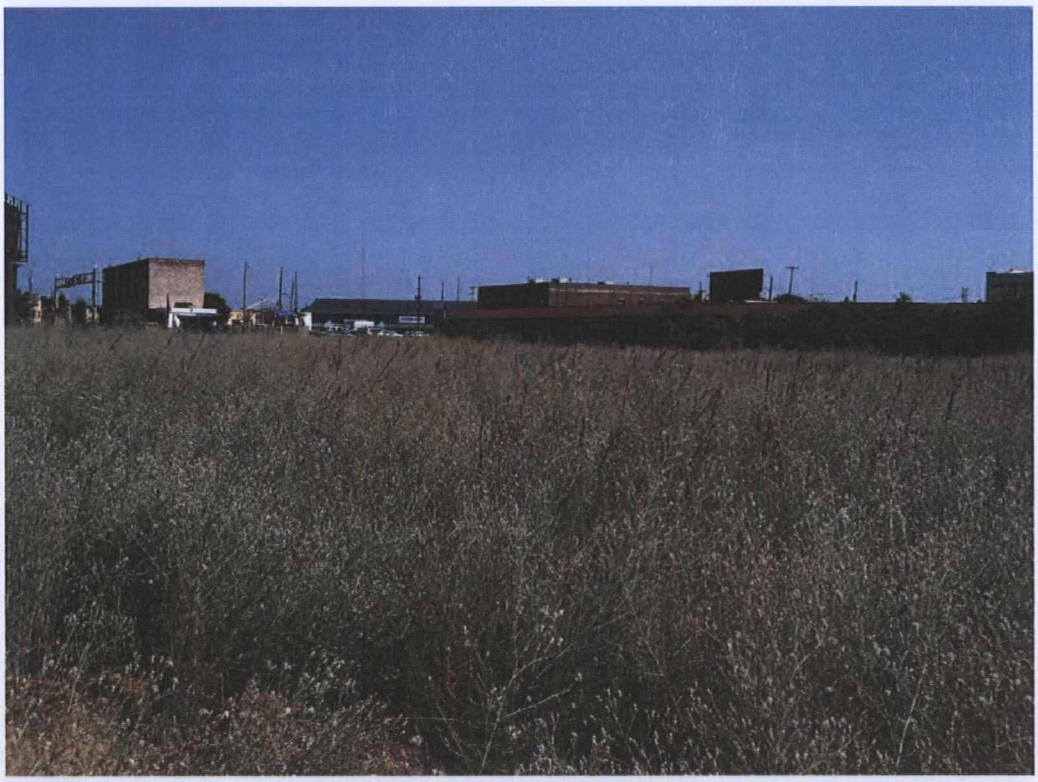
View of parking lot from field

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking northeast

View of area looking north

Structure: SA3-Access-S01 Date: July 17, 2012



View of area looking northeast

View of area looking northeast

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking east

View of area looking east

Structure: SA3-Access-S01 Date: July 17, 2012

Landscape rocks at north end of field

View of area looking south

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking southeast

View of field along parking lot landscaping looking south

Structure: SA3-Access-S01 Date: July 17, 2012

View of east side of area looking south

View of area looking southwest

View of east side of area looking southeast

View of area looking south

Structure: SA3-Access-S01 Date: July 17, 2012

View of area looking south

View of area SA3-A from field

Designation: SA3-Access-S02

Location: SA3-Access-S02 is located on the south side of East Michigan Avenue, east of the railroad tracks east of South Pitcher Street.

Description: SA3-Access-S02 is an asphalt parking lot with concrete curb and gutter accessed from East Michigan Avenue. There is a row of landscaping and drainage swale along the east side between the parking lot and the open field (SA3-Access-S01).

Pre-existing Condition:

- The parking lot is fairly new and in good condition.

Protective Measures:

- The parking lot and landscaping should be identified/protected with construction fencing or similar during the work.

Landscaping southeast of parking lot

Drainage swale southeast of parking lot

Structure: SA3-Access-S02 Date: July 17, 2012

Leaching area southeast of parking lot

Landscaping along east side of parking lot looking north

Landscaping along east side of parking lot looking north

Concrete curb outlet into drainage swale

Structure: SA3-Access-S02 Date: July 17, 2012

Landscaping along east side of parking lot looking north

Concrete curb outlet into drainage swale

Landscaping along east side of parking lot looking north

Drainage swale and concrete light base along east side of parking lot

Landscaping along east side of parking lot looking north

View of landscaping along east side of parking lot looking southwest

View of landscaping along east side of parking lot looking west

View of landscaping along east side of parking lot adjacent to East Michigan Avenue

Designation: SA3-Access-S03

Location: SA3-Access-S03 is located in the northwest corner of SA3-Access-S01 just south of the East Michigan Avenue sidewalk.

Description: SA3-Access-S03 is a Consumers Energy electric pedestal.

Pre-existing Condition:

- The pedestal appears to be in good condition, however it leans to the north significantly.

Protective Measures:

- The pedestal should be identified/protected with construction fencing or similar during the work.

Structure: SA3-Access-S03 Date: July 17, 2012

View of pedestal looking north toward East Michigan Avenue

View of pedestal looking west showing northward lean

Designation: SA3-Access-S04

Location: SA3-Access-S04 is located between SA3-Access-S01 and East Michigan Avenue.

Description: SA3-Access-S04 is a fire hydrant.

Pre-existing Condition:

- The fire hydrant is in fair condition, with paint flaking and minor surface corrosion.

Protective Measures:

- The hydrant should be identified/protected with construction fencing or similar during the work.

View of hydrant looking north toward East Michigan Avenue

View of box looking east showing corrosion

Designation: SA3-Access-S05

Location: SA3-Access-S05 is located between SA3-Access-S01 and East Michigan Avenue.

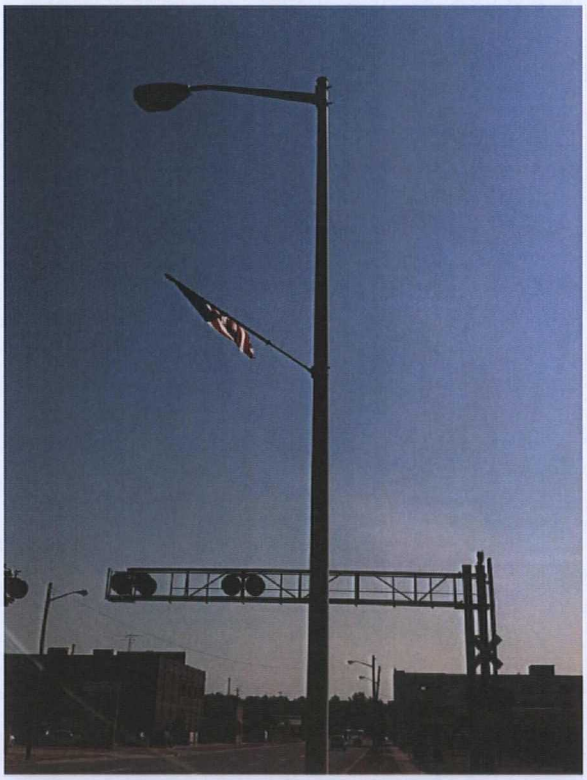
Description: SA3-Access-S05 is a cobra head style light pole

Pre-existing Condition:

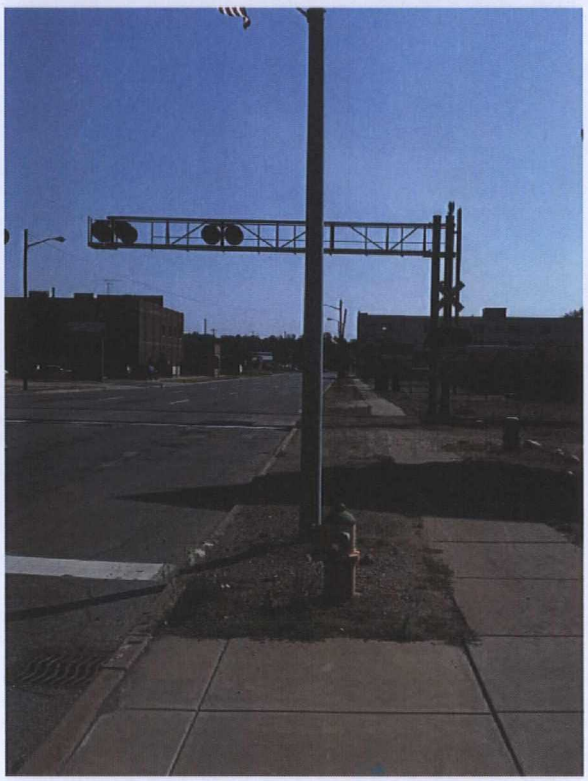
- The pole has minor graffiti but otherwise appears to be in good condition.

Protective Measures:

- The pole should be identified/protected with construction fencing or similar during the work.



View of pole looking east



View of pole looking east showing relation to hydrant and east railroad tracks

Designation: SA3-Access-S06

Location: SA3-Access-S06 is located between SA3-Access-S01 and East Michigan Avenue.

Description: SA3-Access-S06 is a concrete sidewalk parallel with East Michigan Avenue.

Pre-existing Condition:

- The east flag and 3rd from east flag of concrete have moderate cracking.

Protective Measures:

- The existing sidewalk is likely not intended for trucking loads and will likely crack and spall during the work. Damaged sections should be removed and replaced in kind.

View of sidewalk looking east

View of sidewalk looking east showing relation to hydrant and east railroad tracks

Cracking in the east flag and 3rd from east

Cracking in the 3rd flag of sidewalk from the east

Designation: SA3-Access-S07

Location: SA3-Access-S07 is located along the south side of East Michigan Avenue at SA3-Access-S01.

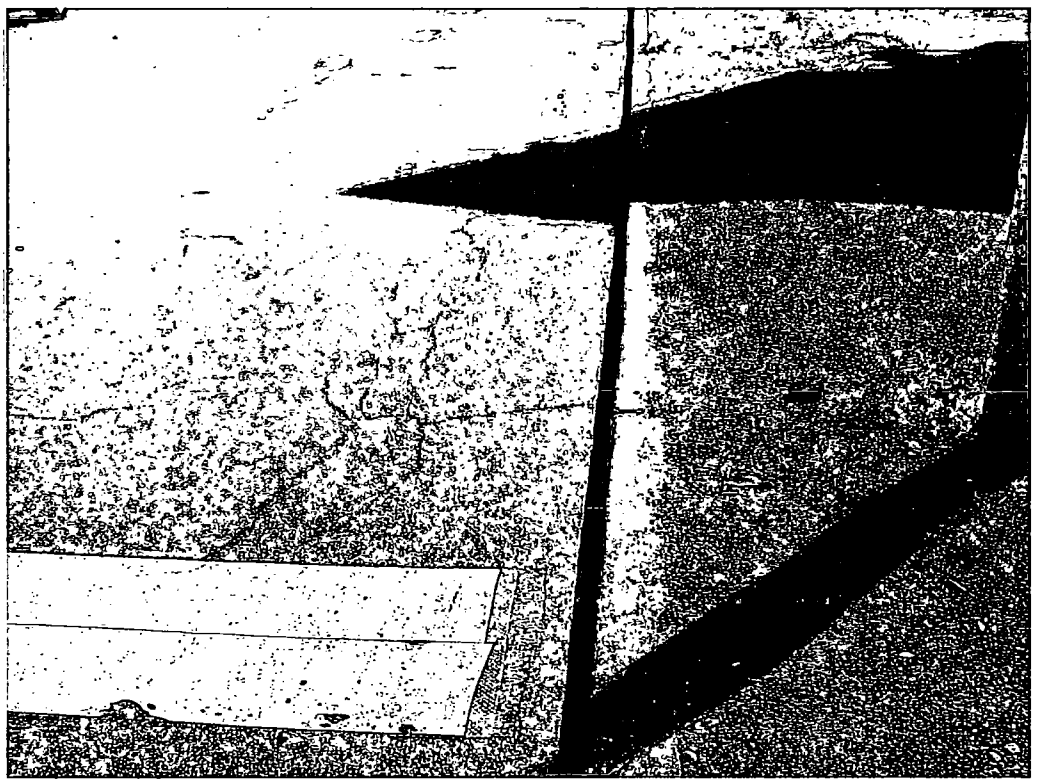
Description: SA3-Access-S07 is asphalt pavement and concrete curb and gutter.

Pre-existing Condition:

- Asphalt pavement has been treated with chip seal. Severe cracking was noted in the pavement.
- The curb pan has been overlaid during subsequent paving operations.
- Scattered cracking and spalling was noted near the railroad stop bar.

Protective Measures:

- Repair asphalt pavement and/or concrete curb and gutter if damaged during the work.



Alligator cracking in asphalt pavement

Block cracking and cold patch in asphalt pavement

Block cracking and cold patch in asphalt pavement

Designation: SA3-Access-S08

Location: SA3-Access-S08 is located between SA3-Access-S01 and East Michigan Avenue.

Description: SA3-Access-S08 is a Consumers Energy electric pedestal.

Pre-existing Condition:

- The pedestal appears to be in good condition.

Protective Measures:

- The pedestal should be identified/protected with construction fencing or similar during the work.

View of the pedestal looking east

View of the pedestal looking south

Designation: SA3-Access-S09

Location: SA3-Access-S09 is located between SA3-Access-S01 and East Michigan Avenue.

Description: SA3-Access-S09 is a billboard structure. The structure is supported on a round steel column and square concrete pedestal.

Pre-existing Condition:

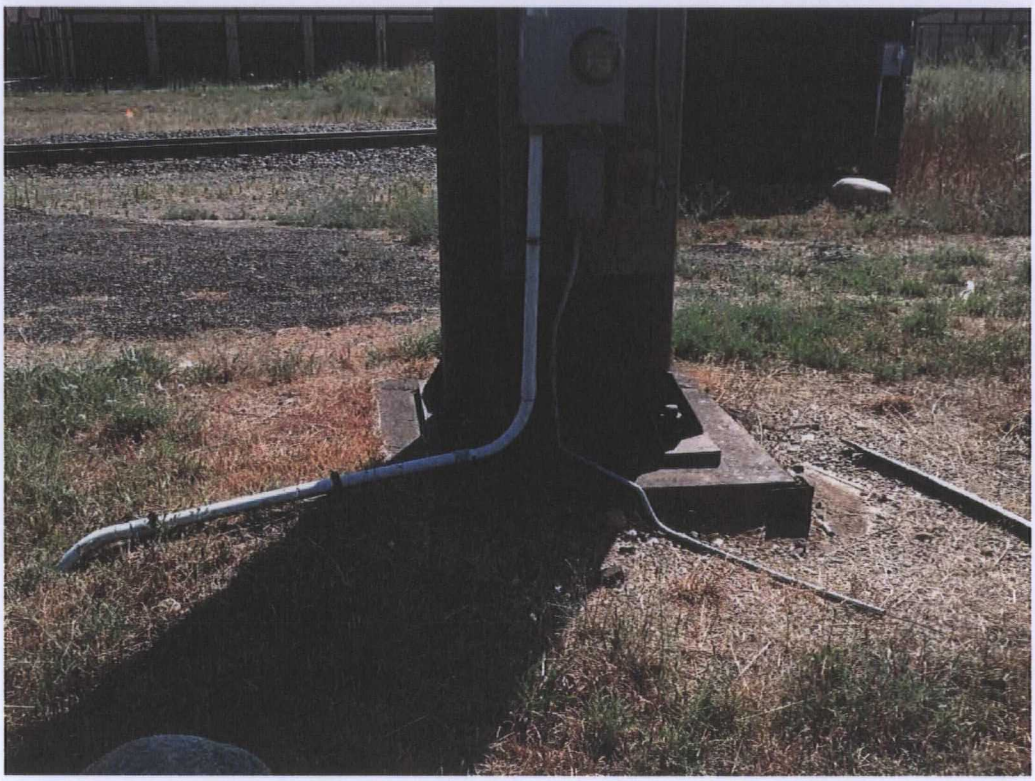
- The steel column has minor scrapes and flaking paint.
- There is an electric service panel on the west side mounted on a timber panel. One of the box covers is loose.
- The electric conduit extending to the southwest is loose.
- The grounding rod is exposed and loose.
- The exposed concrete pedestal has hairline cracking and isolated spalling.

Protective Measures:

- The billboard structure should be identified/protected with construction fencing or similar during the work.

Structure: SA3-Access-S09 Date: July 17, 2012

View of billboard looking east



Conduit and service panel on west side of billboard

View of billboard foundation looking northeast

View of billboard foundation looking north

Ladder on east side of column

View of billboard foundation looking southwest

Structure: SA3-Access-S09 Date: July 17, 2012

Close-up view of service panel

Loose conduit and exposed wire extending to the southwest

Designation: SA3-Access-S10

Location: SA3-Access-S10 is located between SA3-Access-S01 and East Michigan Avenue.

Description: SA3-Access-S10 is a railroad shed structure. It has weathering steel siding and steel angle pedestals. The surface beneath the structure is stone ballast.

Pre-existing Condition:

- The siding has moderate to severe surface corrosion.
- There is a sink hole under the northwest corner.
- There is an electric service panel on the west wall.

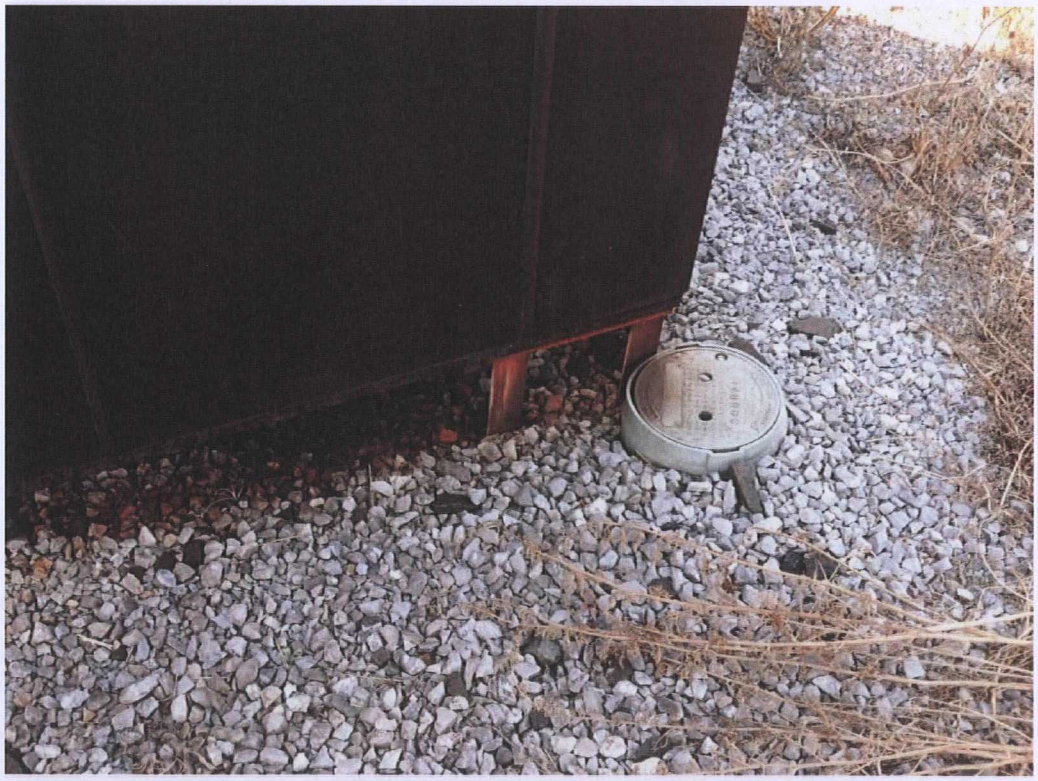
Protective Measures:

- The shed structure should be identified/protected with construction fencing or similar during the work.

Structure: SA3-Access-S10 Date: July 17, 2012

View of shed looking southwest

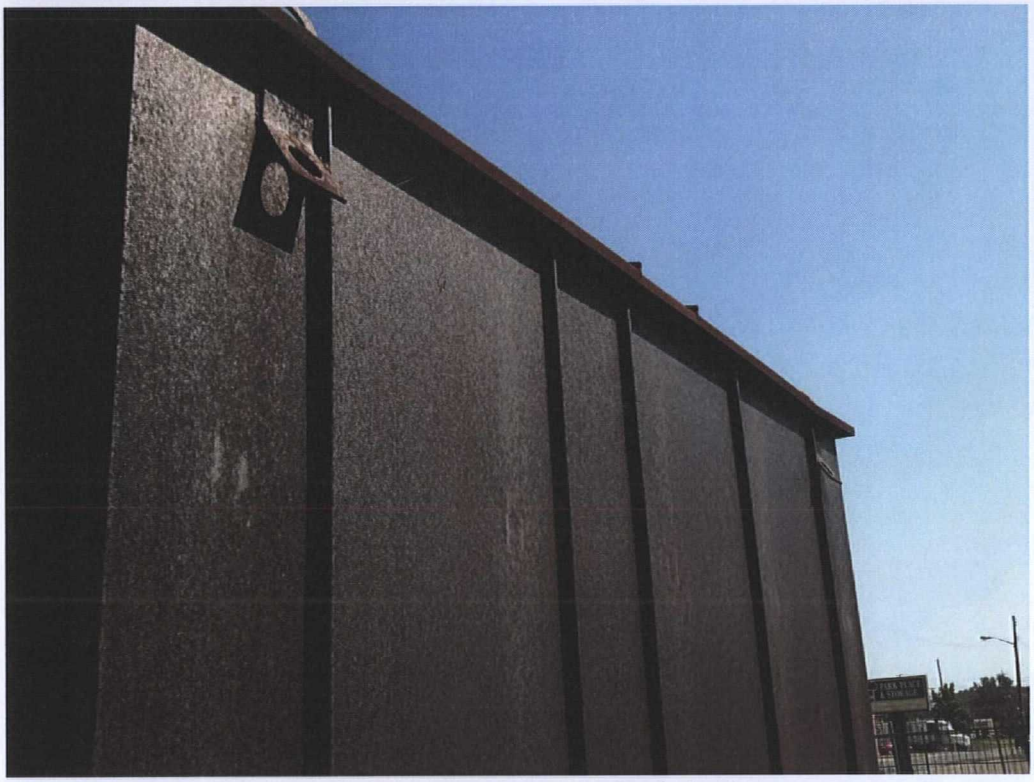
Utility access at corner of shed



Utility access at corner of shed

Electric panel on side of shed

Structure: SA3-Access-S10 Date: July 17, 2012



Surface corrosion on side of shed

View of shed looking northwest

Designation: SA3-Access-S11

Location: SA3-Access-S11 is located along the east side of SA3-Access-S01 just south of SA3-Access-S10.

Description: SA3-Access-S11 is a fiber optic marker post.

Pre-existing Condition:

- The marker post appears to be in good condition.

Protective Measures:

- The marker post should be identified/protected with construction fencing or similar during the work.

Structure: SA3-Access-S11 Date: July 17, 2012

View of marker post looking south

View of marker post looking west